

SEQUENCE LISTING

<110> Arthur Scherf

Louis H. Miller

Benoit Gamain

Dror I. Baruch

Pierre Buffet

Christine Scheidig

Jurg Gysin

Bruno Pouvelle

Nobutaka Fujii

Joseph Smith

<120> IDENTIFICATION OF THE DOMAIN OF

PLASMODIUM FALCIPARUM ERYTHROCYTE MEMBRANE PROTEIN 1
(PFEMP1) THAT MEDIATES ADHESION TO CHONDROITIN SULFATE A

<130> NIH176.001C1

<150> PCT/US00/24195

<151> 2000-09-01

<150> 60/152,023

<151> 1999-09-01

<160> 11

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 10628

<212> DNA

<213> Plasmodium falciparum

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gaagaatctg aatgtggaaa taaaatacgt aattataaaa gaaaaaatgt tgctatagcc 420
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三國志

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<212> PRT

<213> Plasmodium falciparum

<400> 2

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Thr Lys Ala Glu Phe Arg Gly Gly Pro Ser Thr Pro Val Asn Lys His
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Glu Gln Asn Arg Phe Asp Glu Asp Glu Glu Ser Glu Cys Gly Asn Lys
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Ile Val Arg Gly Ile Asp Met Phe Lys Pro Asn Val His Asp Lys Val
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Glu Thr Gly Leu Arg Glu Val Phe Lys Lys Ile His Asp Gly Met Glu
225 230 235 240
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Ala Ile Thr Cys Asp Ala Ser Tyr Lys Ser Gly Tyr Phe Met Gln Ser
275 280 285
Glu Ser Asn Thr Pro Leu Phe Ser Asn Pro Lys Cys Gly His Lys Gln
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Gly Lys Val Pro Thr Asn Leu Asp Tyr Val Pro Gln Tyr Leu Arg Trp
305 310 315 320
Phe Asp Glu Trp Gly Glu Glu Phe Cys Arg Lys Arg Asn Ile Lys Leu
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Lys Lys Val Lys Asp Ser Cys Arg Asn Asp Lys Glu Arg Leu Tyr Cys
340 345 350
Ser His Asn Gly His Asp Cys Thr Thr Thr Ile Trp Lys Lys Gly Ile
355 360 365
Leu His Leu Asp Asn Lys Cys Thr Asp Cys Ser Thr Lys Cys Lys Val
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Pro Leu Asn Gly Asn Ile Val Asp Asp Leu Val Asn Asn Ser Phe Leu
885 890 895
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Met Tyr Lys Glu Lys Asn Asn Leu Lys Gly Pro Lys Glu Val Thr Asp
915 920 925
Pro Lys His Gln Thr Thr Ile Cys Arg Ala Ile Arg Tyr Ser Phe Ala
930 935 940
Asp Ile Gly Asp Ile Ile Arg Gly Arg Asp Leu Trp Glu Arg Asn Gly
945 950 955 960
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965 970 975
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Pro Lys Tyr Leu Lys Leu Arg Glu Asn Trp Trp Glu Ala Asn Arg Ala
995 1000 1005
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 Gln Ser Gln Val Asn Leu Lys Glu Ala Phe Ile Lys Ser Ala Ala Ala
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 Gly Thr Asp Ile Ser Lys Gly His Gly Glu Gly Ser Lys Leu Lys Glu
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 Cys Lys Gly Leu Val Lys Glu Ala Asn Thr Gly Ala Ile Lys Trp Gln
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 1715 1720 1725

ETI/2002

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Ser Asp Asp Asp Tyr Pro Met Gly Lys Asn Arg Asp Glu Gly Thr Ala
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His Lys Glu Lys Glu Leu Glu Lys Leu Val Gly Ala Cys Asn Asp Tyr
1875 1880 1885
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2005 2010 2015
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 Pro Val Glu Ile Lys Leu Tyr Lys Val Phe Glu Tyr Ile Tyr Gly Lys
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3140	3145	3150	
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Val Ile Val Ser Ala Leu Gly Leu Ile Ala Leu His Phe Met Lys Lys			
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Lys His Asp Phe Val Ser Gln Tyr Leu Pro Asn Thr Glu Pro Asn Asn			
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Tyr Ser Asp Asn Pro Glu Glu Lys Pro Phe Ile Ile Ser Ile His Asp			
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Arg Asp Leu Tyr Thr Gly Lys Glu Ile Ser Tyr Asn Ile Asn Met Ser
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<212> PRT
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<223> Xaa = Any Amino Acid

<400> 6

Lys Xaa Asn Gly Xaa Asn

1 5

<210> 7

<211> 294

<212> PRT

<213> Plasmodium falciparum

<400> 7

Val Leu Gln Gln Lys Ser Asn Gly Ser Ile Asp Asn Cys Asn Ala Lys

1 5 10 15

Asn Arg Lys Lys Asn Glu Trp Gln Cys Asp Lys Asn Thr Phe Val Asp

20 25 30

Gly Asn Glu Gly Val Cys Met Pro Pro Arg Arg Lys Ser Ile Cys Ile

35 40 45

His Asn Leu Thr Leu Glu Glu Gln Thr Lys Asn Lys Tyr Gln Leu Arg

50 55 60

Glu Ala Phe Ile Lys Cys Ala Ala Lys Glu Thr Asn Leu Leu Trp Asp

65 70 75 80

Lys Tyr Lys Asn Asp Lys Asn Glu Ala Glu Glu Leu Leu Lys Lys Gly

85 90 95

Lys Ile Pro Glu Asp Phe Met Arg Ile Met Phe Tyr Thr Phe Gly Asp

100 105 110

Phe Arg Asp Phe Cys Leu Glu Asn Asp Met Gly Lys Asp Val Asp Lys

115 120 125

Val Lys Lys Asn Ile Asn Lys Val Phe Asn Asn Ser Ser Lys Arg Gly

130 135 140

Phe Lys Lys Ile Asp Pro Glu Asn Trp Trp Asn Glu Asn Gly Pro Gln

145 150 155 160

Ile Trp Asn Gly Met Leu Cys Ala Leu Ile His Ala Asp Thr Lys Asp

165 170 175

Ser Ile Lys Asn Lys Asp Asn Tyr Lys Tyr Glu Lys Val Thr Ile Leu

180 185 190

Ala Lys Arg Asp Gly Ser Asn Gly Met Thr Leu Ser Glu Phe Ala Lys

195 200 205

Lys Pro Lys Phe Leu Arg Trp Phe Val Glu Trp Tyr Asp Asp Tyr Cys

210 215 220

Lys Glu Arg Gln Lys Tyr Leu Thr Glu Val Ala Ser Thr Cys Lys Ser

225 230 235 240

Ile Asp Gly Gly Gln Leu Lys Cys Asp Arg Gly Cys Asn Asn Lys Cys

245 250 255

Asp Glu Tyr Lys Lys Tyr Met Arg Lys Lys Glu Glu Trp Asn Leu

260 265 270

Gln Asp Lys Tyr Tyr Lys Asp Lys Arg Glu Asn Lys Gly Ile Asp Lys

275 280 285

Gly Pro Ile Gly Ile Ile

290

<210> 8

<211> 407

<212> PRT

<213> Plasmodium falciparum

<400> 8

Asn Gly Gln Asp Gly Thr Lys Lys Ile Glu Glu Cys Asn Thr Lys Tyr
1 5 10 15
Tyr Pro Thr Lys Asn Asp Tyr Pro Gly Trp Asn Cys Thr Asp Lys Val
20 25 30
Ile Asn Arg Glu Glu Gly Ser Cys Met Pro Pro Arg Arg Gln Lys Leu
35 40 45
Cys Ile His Asn Leu Glu His Leu Ser Glu Lys Ala Thr Glu Thr Glu
50 55 60
Leu Arg Lys Ala Phe Ile Glu Cys Ala Ala Ile Glu Thr Phe Trp Leu
65 70 75 80
Trp Asp Lys Tyr Lys Glu Asp Lys Asp Glu Lys Lys Thr Glu Gly
85 90 95
Gly Gly Ile Ser Asp Asp Pro Asp Asp Pro Gln Lys Lys Leu Glu Gly
100 105 110
Gly Thr Ile Pro Glu Asp Phe Lys Arg Gln Met Phe Tyr Thr Tyr Gly
115 120 125
Asp Tyr Arg Asp Phe Leu Phe Gly Thr Asp Ile Ser Lys Gly His Gly
130 135 140
Lys Glu Ser Ala Leu Gly Lys Lys Ile Asp Ser Leu Phe Lys Asn Gly
145 150 155 160
Asp Gln Lys Ser Pro Ser Gly Lys Thr Pro Thr Glu Trp Trp Asn Asp
165 170 175
Tyr Gly Pro Asp Ile Trp Lys Gly Met Val Cys Gly Leu Ser His His
180 185 190
Ile Lys Asn Gly Asn Lys Glu Gln Leu Arg Lys Asn Leu Thr Asp Asn
195 200 205
Asn Lys Tyr Thr Lys Ile Ser Ser Lys Leu Glu Asp Phe Ala Ser Arg
210 215 220
Pro Gln Phe Leu Arg Trp Phe Ile Glu Trp Gly Asp Gln Phe Cys Arg
225 230 235 240
Glu Arg Val Val Lys Ile Asn Gln Leu Lys Thr Gly Cys Asn Glu Tyr
245 250 255
Glu Cys Gly Ser Gln Glu Asn Gly Lys Lys Glu Ala Cys Lys Asn Ala
260 265 270
Cys Glu Ala Tyr Lys Ser Trp Leu Lys Asp Trp Lys Asp Gln Tyr Glu
275 280 285
Gln Gln Thr Ala Lys Phe Asp Lys Asp Lys Lys Phe Asp
290 295 300
Gly Thr Ser Ala Glu Val Asp Val Ala Ala Val Ser Ser Val His Glu
305 310 315 320
Tyr Leu Gln Glu Glu Leu Lys Asn Leu Cys Thr Lys Gly Asp Cys Ala
325 330 335
Cys Met Glu Lys Pro Ser Ala Gln Asp Glu Glu Thr Glu Leu Lys Gly
340 345 350
Gly Asn Tyr Phe Pro Glu Ala Met Asp Tyr Pro Pro Lys Glu Ile Gly
355 360 365
Glu Arg Cys Lys Cys Ala Ile Pro Ser Glu Pro Met Ser Cys Val Glu
370 375 380
Gln Ile Ala Lys His Leu Arg Glu Lys Ala Glu Lys Asn Val Lys Ile
385 390 395 400
Tyr Glu Ser Ser Leu Lys Gly
405

<210> 9
<211> 351
<212> PRT
<213> Plasmodium falciparum

<400> 9
Pro Cys Lys Met Val Gln Lys Leu Ile Ser Glu Gln Ile Glu Lys Asn
1 5 10 15
Asn Ile His Asn Cys Lys Lys Thr Glu Asp Ala Lys Trp Lys Cys Glu
20 25 30
Asn Thr Lys Leu Gly Glu Asp Glu Gly Val Cys Met Pro Pro Arg Arg
35 40 45
Gln Asn Leu Cys Val His Tyr Leu Thr Lys Leu Asn Asp Asp Ser Lys
50 55 60
Glu Glu Asp Leu Arg Glu Ala Phe Ile Lys Ser Ala Ala Ala Glu Thr
65 70 75 80
Phe Leu Leu Arg Gln Tyr Tyr Asn Ser Lys Asn Val Glu Asp Asp Lys
85 90 95
Ile Leu His Arg Asp Met Ile Pro Pro Glu Phe Phe Arg Ser Met Phe
100 105 110
Tyr Thr Phe Gly Asp Tyr Arg Asp Ile Cys Leu Asp Thr Asp Ile Ser
115 120 125
Glu Lys Ile Ala Asp His Asp Val Thr Thr Ala Lys Lys Lys Ile Thr
130 135 140
Ala Val Phe Gln Lys Ile Gly Ser Lys Thr Thr Asn Gly Lys Lys Val
145 150 155 160
Leu Glu Arg Glu Gly Trp Trp Lys Glu Tyr Gly Leu Ser Ile Trp Lys
165 170 175
Gly Met Leu Cys Ala Leu Ser Tyr Asn Thr Glu Thr Lys Lys Met Asp
180 185 190
Glu Gly Val Arg Thr Tyr Leu Met Lys Tyr Ile Tyr Lys Asn Asn Asp
195 200 205
Ile Lys Glu Tyr Leu Glu Glu Phe Ala Ser Arg Pro Pro Phe Leu Arg
210 215 220
Trp Val Thr Glu Trp Gly Glu Asp Phe Val Lys Asn Arg Lys Lys Glu
225 230 235 240
Leu Val Ser Leu Lys Lys Cys Asp Ser Cys Thr Leu Arg Asn Asn
245 250 255
Gly Thr Ser Asn Lys Thr Cys Asp Asp Asn Glu Asn Cys Gly Ala Cys
260 265 270
Lys Thr Gln Cys Glu Lys Tyr Lys Lys Trp Met Glu Arg Trp Lys Lys
275 280 285
His Tyr Ser Ser Gln Lys Lys Lys Phe Gln Leu Tyr Lys Asn Ser Ala
290 295 300
Thr Tyr Asn Asn Gly Leu Ala Val Lys Glu Ala Asn Ser Glu Thr Tyr
305 310 315 320
Lys Asn Asp Pro Glu Val Thr Glu Ala Asn Ser Ala Lys His Ala Arg
325 330 335
Asp Tyr Leu Lys Thr Gln Leu Glu Asn Met Ile Cys Thr Asn Gly
340 345 350

<210> 10

<211> 311
<212> PRT
<213> Plasmodium falciparum

<400> 10
Glu Thr Asp Asp Ile Asp Gly Cys Asn Gln Lys Tyr Lys Ala Gly Lys
1 5 10 15
Asp Lys Tyr Pro Gly Trp Asp Cys Asn Ser Gln Ile His Thr Thr His
20 25 30
Asn Gly Ala Cys Met Pro Pro Arg Arg Gln Lys Leu Cys Val Ser Gly
35 40 45
Leu Thr Lys Thr Asp Arg Ile Lys Ala Ile Glu Tyr Ile Arg Thr Glu
50 55 60
Phe Ile Lys Ser Ala Ala Ile Glu Thr His Phe Ala Trp Asp Arg Tyr
65 70 75 80
Lys Glu Asp Asn Gly Glu Ala Glu Ala Glu Leu Lys Asn Gly Asn Ile
85 90 95
Pro Glu Gly Phe Lys Arg Gln Met Tyr Tyr Phe Gly Asp Tyr Arg
100 105 110
Asp Ile Phe Phe Gly Arg Asp Ile Ser Thr His Ala Tyr Ile Ser Gly
115 120 125
Val Ser Pro Lys Val Ile Thr Ile Leu Glu Lys Glu Asn Asp Ala Lys
130 135 140
Tyr Ala Ala Lys Gln Asn Ser Asn Asn Glu Leu Leu Asp Asp Trp Trp
145 150 155 160
Asp Gln His Gly Lys Asp Ile Trp Glu Gly Met Leu Cys Ala Leu Thr
165 170 175
His Lys Ile Ser Asp Glu Glu Lys Lys Glu Ile Lys Asn Lys Tyr
180 185 190
Ser Tyr Lys Lys Leu Asn Glu Ser Pro Lys Gly Ser Asn Lys Val Glu
195 200 205
Asp Phe Ala Lys Lys Pro Gln Phe Leu Arg Trp Phe Ile Glu Trp Gly
210 215 220
Asp Glu Phe Cys Ala Gln Arg Glu Glu Lys Glu Ala Lys Val Lys Val
225 230 235 240
Ser Cys Ser Asp Ala Lys Asp Tyr Asp Gly Cys Lys Asn Thr Lys Ser
245 250 255
Asn Ala Ser Cys Val Ser Ala Cys Lys Val Tyr Glu Asp Tyr Ile Thr
260 265 270
Lys Lys Lys Val Glu Tyr Thr Lys Gln Lys Gly Lys Phe Asp Ala Glu
275 280 285
Lys Ile Thr Asp Lys Glu Gly Tyr Glu Gly Phe Ser Thr Lys Asp Ala
290 295 300
Ser Glu Tyr Leu Lys Lys Lys
305 310

<210> 11
<211> 308
<212> PRT
<213> Plasmodium falciparum

<400> 11
Gly Asn Asp Gly Ser Asn Glu Ile Ser Gln Cys Asn Pro Lys Glu Ser
1 5 10 15

Tyr Pro Asp Trp Asp Cys Lys Asn Ile Asp Asn Ser His Ser Gly
20 25 30
Ala Cys Met Pro Pro Arg Arg Gln Lys Leu Cys Val Arg Asp Leu Thr
35 40 45
Gln Gly Gly Glu Ile Arg Lys Pro Glu Asp Ile Leu Thr Lys Phe Ile
50 55 60
Asn Cys Ala Ala Lys Glu Thr His Phe Ala Trp His Lys Tyr Lys Lys
65 70 75 80
Asp Asn Val Asn Ala Glu Asn Glu Leu Lys Ser Gly Lys Ile Pro Glu
85 90 95
Gly Phe Arg Lys Gln Met Tyr Tyr Phe Gly Asp Phe Arg Asp Ile
100 105 110
Phe Phe Gly Thr Asp Ile Ser Ser Cys Arg Tyr Ile Lys Asp Thr Ser
115 120 125
Gln Thr Ile Lys Ser Lys Leu Gly Asp Gln Ala Thr Thr Glu Lys Gly
130 135 140
Asp Thr His Ile Asp Asp Asn Lys Leu Gln Glu Trp Trp Thr Ile
145 150 155 160
His Gly Pro Lys Ile Trp Glu Gly Met Leu Cys Ala Leu Thr Asn Gly
165 170 175
Leu Ser Glu Ser Glu Lys Lys Asn Ile Leu Gln Asp Tyr Ser Tyr Asn
180 185 190
Lys Leu Asn Asn Ala Glu Lys Asp Asp Cys Cys Leu Glu Lys Phe Ala
195 200 205
Ser Lys Pro Gln Phe Leu Arg Trp Tyr Val Glu Trp Ser Asp Glu Phe
210 215 220
Cys Arg Glu Arg Lys Lys Leu Glu Asp Lys Val Glu Asp Val Cys Ile
225 230 235 240
Lys Ala Lys Asp Tyr Glu Gly Cys Lys Asn Asn Lys Ser Asn Asn Ser
245 250 255
Cys Val Lys Val Cys Lys Glu Tyr Glu Asn Tyr Ile Thr Gly Lys Lys
260 265 270
Thr Gln Tyr Glu Ser Gln Glu Gly Lys Phe Asn Thr Glu Lys Arg Gln
275 280 285
Lys Lys Pro Glu Tyr Asn Ser Tyr Ser Lys Lys Asp Ala Ser Glu Tyr
290 295 300
Leu Lys Asp Lys
305